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Bank Regulation and its impact on Profitability

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Abstract

With our study we intend to find out whether there is a strong relation between regulation and banks profitability. One might be expecting that if the level of regulation is very high, that is too demanding, then bank returns would decrease, not only because costs would go up but also because restrictions normally mean less business. On the other hand, more regulation may mean more efficient banks that work in a healthy environment and therefore could generate more profit.

We tried to find out whether there is a relationship between commercial banking *Profitability* (proxied by ROA) and explanatory variables that directly or indirectly are influenced by *Regulation*. We built an unbalanced panel data set for 16 years and with information for more than 12.500 different commercial banks in the world.

Using slightly different models relating ROA with explanatory variables that directly or indirectly may be considered as proxies for regulation, we conclude that normally bank size and Equity to Total Assets have a positive relationship with ROA. That is, in general, larger and more capitalized banks have better profitability. On the other hand, Tier 1 Ratio and belonging to the Crisis Group is negatively linked to bank profitability.

As expected, banks belonging to countries in the Crisis Group during the latter financial crisis suffered more than others in terms of decreasing their results. This variable in all models studied had a negative relationship with profitability.

The negative relationship between Tier 1 Ratio and ROA means that larger Tier 1 ratios have not been associated with larger bank returns. Of course we must always take into account that there is an important risk return trade-off associated with this ratio. That is less risk meaning higher Tier 1 means smaller funding costs and less return.

Key Words: Financial Crisis; Regulation; Bank profitability; Determinants of Bank Performance; Supervision; Banks

1- Introduction

“Regulation- a tough environment getting even tougher” (Bugrov, Dietz, & Poppensienker, 2016)

According to Mckinsey Global Banking annual Review 2016, regulation will continue to affect bank's profits by: 1st) Increasing operating costs, derived from implementation of new regulatory obligations, new reporting and model requirements and more rules on compliance; 2nd) New rules imposing additional capital requirements beyond the levels set by current Basel III targets to be implemented by 2019.

At the same time, some banks have informed publicly that their expenses on regulatory issues were well over \$1 billion annually between 2010 and 2015, while many increased their core capital ratios due to Basel III implementation.

It is unquestionable that the recent financial crisis has put a lot of pressure on regulation. There is a consensus that regulation is the adequate medicine to prevent future illness. However, it is legitimate to ask if the medicine can kill the patient?

The period from July 2007 to December 2008 corresponds to the greatest destruction of bank wealth since the Great Depression, and is normally called as the Financial Crisis. Was the poor performance of the banks the outcome of a financial earthquake that was completely unexpected and unpredictable, or were some banks more predisposed to experience large losses? Did ineffective regulation contribute or even caused the collapse?

(Ting, 2017) summarizes in a perfect way what happened: *“The credit freeze that resulted from the 2008 financial crisis brought the global financial system to the brink of collapse (...) central banks purchased a total of US\$2.5 trillion in government debt and troubled private assets from banks. This amount was the largest liquidity injection into credit markets and the largest monetary policy action in world history.”*

The dimension and complexity of banks have considerably increased over time. Therefore, on the one hand regulators were short on accurate knowledge of banks' activities, which made difficult an accurate assessment of the banking sector. On the other hand, one can argue that even the banks themselves could not have a clear and exact notion of their global level of risk.

The financial crisis has indeed revealed that the global understanding of bank activity undertaken by banks is limited but even more important is that even banks themselves have lost the notion of their general risk. Nowadays the methodologies for risk assessment have been developed a lot not only in terms of risk of default but also in terms of operational risk and compliance risk.

Many empirical studies on bank profitability have focused either on cross-country evidence or on the banking system of individual countries. Bank profitability is usually measured by the return on average assets and is normally explained by internal and external determinants. The internal determinants include bank-specific variables, like bank size, capital ratio, risk, operational efficiency, ownership of a bank (state-owned or privately owned). The external reflect macroeconomic variables include economic growth, inflation, exchange rates, central bank interest rate, and so forth.

Available literature provides an extensive examination of the effects of industry-specific, bank-specific and macroeconomics determinants on bank profitability. However, much less is known about how regulation influences bank profitability.

If it were not for the strong impacts on everyone's lives of the 2007 banking crisis, would anybody be studying bank regulation and its impacts? According to (Laeven & Valencia, 2010) we must go back to the period of the Great Depression to find a similar financial stress to the one that occurred from 2007 onwards. The collapse of the subprime residential mortgage market in the United States was just the beginning of a complex and strong global hurricane that the complex financial derivatives and the world big exposure to US real estate assets helped to increase in strength and power of destruction.

Policymakers used extensive liquidity support and guarantees to implement recapitalization policies, but the economic cost of the more recent crisis was on average larger than that of past crises, in terms of output losses and increases in public debt. The collapse of the investment bank Lehman Brothers, and the government bailouts of insurer AIG and mortgage lenders Freddie Mac and Fannie Mae may have been the main drivers for the crisis, but the rapid and stormy way they spread to almost all world economies made world leaders think about how they can avoid this kind of incidents in the future. And the general answer has been more regulation, more capital, and more costs to the banking industry. At the same time, public opinion and its importance in getting more business made banks' compliance policies stronger and dissuasive for acquiring new business. More costs and less business... are we really building a stronger financial system?

I have been working in the banking industry for more than 23 years and I realise the increasing difficulty to acquire new customers, and new business. Further, I can witness how easily Fintech are taking business from the traditional banking industry. They attract specific lucrative segments with simple and agile technology and little costs compared to traditional banks. Will bank regulation destroy the traditional banking industry or will it be able to prevent Fintech to feed an even bigger crisis in the future?

The dimension and strong economic impact of the recent financial crisis has changed the banking research agenda. (Wilson, Casu, Girardone, & Molyneux, 2009) in their article about new directions for research in banking make clear where to focus in terms of future investigation: a) how may different business models and consequently different strategies affect the sector's stability; b) does the assumption by banks that there will always be a safety net, i.e. does a potential government bailout to avoid them from bankruptcy imply more risk, leverage and instability?; c) do financial innovation, new technologies and new products impact on bank stability; d) given the clear impact of securitisation and other risk management practices in banking efficiency, do the available risk models really take into account all risks that can be associated to the banking industry?; e) are corporate governance, intellectual capital, ownership structure and board of directors compensation scheme attentively analysed?; f) Capital requirements, liquidity, fair value accounting and the relation between banking industry and the economic cycles, also need further investigation."

An important question in the banking debate is whether regulation is invigorating or slowing down retail banking from its recovery. What are the main consequences of multiple, but uncoordinated reform frameworks like Basel III¹ requirements, the Capital Requirements Directive IV in Europe², the Dodd-

¹ *Adapted from WIKIPEDIA* **Basel III** (or the **Third Basel Accord**) is a global, voluntary regulatory

Frank Act in the US³, and the independent Commission on Banking Report in UK⁴, and so forth?

At the same time, the EBA- European Banking Authority (EBA, 2012) states in its first annual report that the main risks surrounding bank activity in Europe are: “1st) Sovereign Risk; 2nd) Funding and Liquidity risk; 3rd) Deteriorating asset quality; 4th) Business model Changes; 5th) Capital levels and Deleverage; 6th) Asset encumbrance; 7th) Fragmentation of the single market; 8th) Challenge of Shadow banking.” As a response to the Financial Crisis Banks are changing their business models focusing on their traditional “core” activities, which may be defined as simpler, lower risk and domestic business. This means more retail bank generated revenues and less trading revenues, better asset-liability matches, reduce activity in investment banking. The need to meet stricter capital requirements has imposed a decreased or even no cash dividends and also limited new equity issuance. Another tendency is the increased demand for simpler, safer and more transparent bank products. It is time to go back into basics!

At the present moment, to be able to launch a new product in a bank one do not just have to have a good idea that the technological department can implement. We must have the agreement from the anti-money laundry department, from the legal department, from compliance, from the accounting department, from the commercial area, from the marketing department, from headquarters if we have one, and so forth. This is why normally to launch a new product there must be a strong demonstration that not only it will pay back the effort of developing and implementing it, but also that it will be softly accepted by the market and supervisory authorities. And if it is good enough it will be quickly copied and implemented by our peers. Is it really worth innovating?

framework on bank [capital adequacy](#), [stress testing](#), and [market liquidity risk](#). It was agreed upon by the members of the [Basel Committee on Banking Supervision](#) in 2011, and is supposed to be implemented by 31 March 2019. This third agreement following the first two, was considered indispensable because of the financial distress that occurred in 2007 and that had its start with Lehman Brothers bankruptcy. It intends to give the banking system more stability and strength .

² ***Adapted from WIKIPEDIA*** The **Capital Requirements Directives (CRD)** for the [financial services industry](#) have introduced a supervisory framework in the [European Union](#) which reflects the [Basel II](#) and [Basel III](#) rules on capital measurement and capital standards. Member States have progressively transposed it, and firms of the financial service industry thus have had to apply, the CRD from January 1, 2007. Banks could choose between the initial [basic indicator approach](#), which increases the minimum capital requirement in [Basel I](#) approach from 8% to 15% and the [standardized approach](#), which evaluates the business lines as a medium sophistication approaches of the new framework. The most sophisticated approaches, Advanced IRB approach and AMA were available from January 2008.

The new CRD IV package entered into force on 17 July 2013: this updated CRD simply transposes into EU law the latest global standards on bank capital adequacy commonly known as [Basel III](#), CRD IV commonly refers to both the EU Directive 2013/36/EU and the EU [Regulation 575/2013](#).

³ ***Adapted from WIKIPEDIA*** An Act to promote the financial stability of the United States by improving accountability and transparency in the financial system, to end "too big to fail", to protect the American taxpayer by ending [bailouts](#), to protect consumers from abusive financial services practices, and for other purposes. The **Dodd–Frank Wall Street Reform and Consumer Protection Act** commonly referred to as **Dodd–Frank** was signed into United States [federal law](#) by [President Barack Obama](#) on 2010. And it represented a response to the [financial crisis of 2007–2008](#), it brought the most significant changes to [financial regulation](#) in the United States since the regulatory reform that followed the [Great Depression](#).

⁴ ***According to WIKIPEDIA*** “The **Independent Commission on Banking** was a United Kingdom government inquiry looking at structural and related non-structural reforms to the UK banking sector to promote financial stability and competition in the wake of the [financial crisis of 2007–08](#). It was established in June 2010 and produced its final report and recommendations in September 2011.”

A very interesting idea about who should support the cost of bankruptcies is discussed in the book *The Future of Banking*, (Beck, 2011). The author debates whether forcing financial institutions to internalise the external costs that risk-taking decisions and their failure impose on the rest of the economy would not be better than “privatising profits and nationalising losses”.

Does bank regulation have a strong negative impact on profitability, as one might be expecting? Or does it have no impact at all, because banks are able to pass the costs to customers, or by using tax shields to protect themselves from increasing interference from regulators worldwide. Are there significant differences between countries? It is our goal to contribute to this debate with new findings, using a comprehensive database including banks from different countries. Finally, to the best of our knowledge there are no empirical studies examining the impact of Regulation on Bank profitability that use a database covering all banks in the world over more than 16 years.

With our study we intend to find out whether there is a strong relation between regulation and banks profitability. One might be expecting that if the level of regulation is very high, that is too demanding, then bank returns would decrease, not only because costs would go up but also because restrictions normally mean less business. On the other hand, more regulation may mean more efficient banks that work in a healthy environment and therefore could generate more profit.

We will be using a database that includes almost all commercial banks in the world and select indicators for each bank during a period of 16 years from 1997 to 2012 that represent its profits and other variables that we consider to be proxies for regulation. We will build a robust regression model and test whether the variables that represent regulation contribute to explain how bank earnings evolved.

Then we will group the banks by world zones and try to find out whether there are significant differences in the main conclusions among these regions.

2- Literature Review: main debates on the relation between Regulation and Profitability

“...faith in markets has given way to faith in regulation...” (Ayadi, Arbak, & Groen, 2012)

Even though many years have passed, I still have a fresh memory of when I was an undergraduate economics student and on one of my first classes we were introduced to the market of perfect competition. We then learned the great advantages of letting the market work for itself. If there was enough competition among firms present in the market eventually we would be in the perfect world. That meaning the better equilibrium position for consumers and suppliers, but much more important than this we would be able to achieve the biggest welfare for the society as a whole. Having this interiorised we were taught how bad monopoly, and oligopoly could be, and the big decrease in social welfare that was generated when the market by some reason got way from perfect competition. I still have nightmares with that triangle that measured the welfare lost for the society when one gets away from perfect competition. The order was: “Laissez faire laissez passer”... let the market work!

After the financial crisis, confidence in the markets gave way to a strong believe in regulation, and on the supervision power of authorities in each country. There is a strong belief that the only way to avoid another crisis is that some kind of authority, almost a mythological one, will have more strength than market power to avoid another breakdown. As we will see most frameworks that implement bank regulation are in many senses disconnected from the market. Will this really put us in a better and more efficient world?

According to (Ayadi, Arbak, & Groen, 2012) regulation is at a turning point as the tendency on the way to deregulation and soft supervision has given way to more in-depth and ample regulation and supervision. To be straight to the point: **“faith in markets has given way to faith in regulation”**. This study reveals that applying the international agreement Basel III in EU law may be not as effective as one could presume, because rules established in this accord are not as eager as the people that created them say they are. This study shows that non-identical business models are susceptible to different sorts of risks and consequently the rules should always be adjusted to each business practice.

The concept that we are reinforcing regulation and decreasing our belief in market efficiency is also expressed in (Kay, 2010): “There is nostalgia for a time when the Bank of England acted as coordinator of a self-regulating club of financial institutions.” The banks were supposed to help each other in times of difficulties, and the Bank of England defended the interest of the City within the Government. However a worldwide interconnected financial market, an increasing international competitiveness and deregulation has killed now and I can guess forever this pattern. For the author regulation that is not clear and straight to the point and that cannot be easily implemented and controlled is completely purposeless.

The main issue is that financial services companies must be structured so that in the event of an overall failure of the organisation they are able to separate core normal activity from speculation and conscious leverage and risk taking activities. That means the establishment of distinct narrow/focused/small scope banks.

But being aware of the intensive growth and importance of regulation, how does this interact with

economic development? Is an economy able to bloom without having credit to implement new projects? How does the banking system impact on enlarging the scope of new business creating value in the economy? Can shifts in monetary policy affect effectively the pace of an economy?

Another interesting perspective to analyse is whether contrasting regulation frameworks can imply dissimilar results. Are there differences between developed and non-developed economies? Were there countries that were able to stay out of the financial crisis? Did divergent business models generate different results? Has the anticipation of public support implied more unconscious leverage?

Banks that mixed investment and commercial traditional bank were more successful than the ones that focused just in one of these activities? Should regulation take into account the business model of the bank?

Does the increase in capital requirements imply better and more useful commercial banks? Shall capital requirements be interconnected with clear market driven objectives? Are there too big to fail banks? That is, are there some banks that an economy cannot allow to disappear, and because of this is available to pay the price to keep them working on even if they are inefficient?

Did intellectual capital and corporate governance impact on the way the crisis emerged?

In the next sections we will try to summarize the most relevant literature perspectives on each of these topics.

2.1-Connection between banking system and Economic Growth

The direct connection between the banking system and economic growth and development has been the main reason for the study of the evolution and stability of the banking sector. Bank profitability is perhaps the most important indicator for bank shareholders, but for the rest of the stakeholders indicators that capture the impact of financial institutions on the welfare of society should be taken in more consideration. Using a dataset of 228 banks over the 2005-2013 period (Trenca, Zapodeanu, & Cociuba, 2014) observed that main touchstone for bank achievement like capital adequacy, operational results, asset quality and liquidity have worsen dramatically in the latest years.

(Bolt, Haan, Hoeberichts, Oordt, & Swan, 2012) found evidence that bank earnings are pro-cyclically this trend is especially vigorous during deep economic decline. Normally during these period the weakest companies go bankrupt and they default with their banks, consequently loan-loss provisioning increases banks costs and financial gain goes down. They were able to establish a direct trend between real GDP contraction and the return of bank assets.

Despite being clear that bank performance has decreased significantly as a consequence of the financial crisis, (Gambacorta & Shin, 2016) using a database of 105 advanced economy banks, found that more capital is associated with exceptional lending capability, mainly because better capitalised banks have lower funding costs. They have established a positive relation between a higher ratio of equity to total assets and the reduction in the cost of funding. This relation allows more bank lending at lower prices, thus stimulating economic growth.

Credit is essential for transmitting monetary policy to real economy, and therefore bank capital is tremendously important not only for supervision issues, but for the effectiveness of monetary policy.

Since the crisis, there has been a change in the implementation of monetary policy. In correspondence to

the behavior of asset holders themselves, who, in times of crisis, desired to trade off lower returns with more stable asset values. Monetary policy has changed from one focused in stabilizing income to one aiming to preserve asset prices that is maintain wealth.

(Seccareccia, 2017) uses the quantitative easing policy (QE)⁵ in the US, which coincided with a strong collapse of real interest rates, while asset prices were stabilized to explain a lower profitability for the banking industry after the crisis. In the 70's due to the oil crises most Central banks have established goals for monetary policy by controlling monetary aggregates with the main aim of reducing inflation. However, in the early 1990s it became institutionally established the inflation-targeting monetary policy regimes. Under this regime whenever the inflation rate moved either upward or downward in relation to its target level, the central bank would move the central-bank-administered money rate in the some direction to balance the goal. But, after 2008, the focus of monetary policy abruptly shifted from sustaining high return *on* financial capital to largely preserving the value *of* financial capital.

The author is able to demonstrate that QE is a successful instrument because at the same time it maintained asset prices, it brought down interest rates. Of course lower interest rates also implied that asset holder's returns have decreased. On the econometric models results it is found that: a) the growing excess reserves resulting from the central banks buying the bad MBS implied lower returns, because they were by far less lucrative than former returns on the MBS; b) These low spreads explain why the coefficient that explains ROE on the QE policy was not significant at all; c) The coefficient explaining the purchases of total reserves had a negative contribution to ROE; d) The trade-off between lower returns and sustained asset values, applied to the total banking industry, did have a negative impact on bank profitability.

(Ting, 2017) addresses two important questions: a) Did the crisis influence the link among financial development and commercial bank paybacks?; b) Did liberalization in the banking industry have a negative impact on banks' financial gains in the post-crisis period? He takes into account the size and liberalization level of banks, the country's development level, and the government participation on the banking sector to conclude that a developed financial system makes it easy for economic growth, but at the same time economic growth impacts on the development of the commercial banking sector. For him bigger aggregation, that is bigger banks, gives a positive contribution to a higher level of resilience to harmful market shocks. The effect of the crisis would have been smaller if the banking sector was larger.

The author built a model explaining ROA by the level of financial development, government involvement, size and liberalization of the banking sector. From the results of such model he concludes: a) bigger banks implies more profits and better asset quality; b) more liberalization has a negative impact on ROA; c) liberalization was of the main causes of the crisis, strong inter-related banks and world trade of toxic securities helped the crisis be born and fed it to tease high damages to the world economy. In his opinion, the main political consequence of his findings is that financial liberalization should occur only when institutions that are necessary to enforce laws and contracts as well as to ensure effective prudential regulation and supervision are fully developed and operational. He also defends that in developed

⁵ **Adapted from WIKIPEDIA** “Quantitative easing (QE), is an expansionary monetary policy where the central bank buys securities with the aim of increasing money demand. This increase ceteris paribus allows interest rates to go down which allows investment to increase and consequently increases economic growth.

countries with a small banking sector or high financial liberalization, banks should claim on a stronger government action to increase bank profitability.

Using a comprehensive dataset of systemic banking crisis in Europe (Antunes, Bonfim, Monteiro, & Rodrigues, 2014), found that the main indicators that allow to signal an emerging crisis are: a) growth of debt; b) equity prices; c) credit to GDP gaps; d) house prices growth.

2.2-Different Regulation frameworks implies Different Outcomes

The financial crisis was global, leading to an urgent demand for less market and more regulation in most countries. But the latest update on the study Bank Regulation and Supervision Survey, directed by the World Bank and presented by (Cihak, Demirguc-Kunt, Peria, & Cheraghrou, 2012) lays down that the financial crisis has had different levels of impact in distinct countries. According to this study the group of crisis countries had some common characteristics: lax definition of capital; decreased capital ratios; fewer limitations to become involved in non-bank activities as for instances insurance, real estate and investment banking; permissive treatment of default loans and loans provisions; even though having stronger information disclosure requirements, they had not sufficient incentive for the private sector to supervisor banks. Notwithstanding the ferocity of the crisis, the pace of change in regulation has been very relaxed.

According with (Cihák & Tieman, 2008) even though high income countries have in general better capabilities in terms of the quality and effectiveness of supervision, they also face far more complex financial systems. Therefore we saw that most developed high income countries were strongly affected. Of course the models of supervision are different among different countries, and it is evident that medium or low income countries were worse prepared to pass through the crisis, and so the level of economic development is an important explanatory factor.

The studies of (Dietrich & Wanzenried, 2014) investigate whether economic development of a country measured in terms of income impacts on banks returns. Low income countries show a tendency to be less competitive, that is, on average they generate higher returns and also larger net margins. Also in this group of countries normally private banks generate more profit than public banks. Usually GDP growth and other macroeconomics variables are essential for explaining profitability. In contrast, in more developed countries one can observe more competition, higher efficiency on capital assignment, lower profitability and less impact from macroeconomic environment.

Even though the crisis has affected most countries, some were undoubtedly less affected than others. For instance, Canada's banking system has performed well and much differently from other also developed countries. In 2008, the World Economic Forum has considered Canada that has the solidest financial structure in the planet. According to (Northcott, Paulin, & White, 2008) this excellent accomplishment derives from a solid and sound economy, a very prudent risk management, and most of all a muscular regulatory mechanism.

There is a stream of literature that shows that different banking business models had different outcomes during the crisis and post crisis. (Hryckiewicz & Kozłowski, 2015) are able to identify that banking strategies focused on investment banking, that is a main activity based on trading and most funding coming from secondary market and not from customers deposits, out-turned in a deeper even though

shorter financial distress. Examples of banks that have followed this strategy are: Citibank, UBS, ING and Deutsche Bank. Contrasting to this kind of strategy, banks like Mitsubishi UFI, Industrial and Commercial Bank of China or Sumitomo Mitsui prioritize traditional banking models, that is, having most of their funding supported by their clients' deposits and getting most of their earnings from cautious and well analyzed credit to diversified clients. This last group has experienced a smooth crisis however with a larger full length. From one extreme to the other there is a vast scope of banking models in between from specialized lending, to more diversified models or to truly specialized investment banks.

The main outcomes from this study are that: a) most of the systematic risk comes from the asset structure heavily concentrated on badly evaluated mortgage backed securities; b) a funding structure too much dependent on market availability of money, and lower capitalized banks represented an emerging risk; c) banks' strategies that were based mostly on investment banking endangered dramatically banks' returns, though for a shorter period; d) it is urgent to establish measures that take into account asset and liability correlations, and e) diversification ensures greater stability, that is making restrictions on bank activities can imply a bigger risk⁶

Even though all big banks have experienced a strong decrease in their stock values from 2007 to 2008, there was a significant variation among banks. Using a sample of 100 big banks (Beltratti & Stulz, 2009) tried to find out what were the banks' characteristics that made the difference to the performance during the crisis and after it. They use several explanatory variables to explain the stock return of banks. The banks that went better through the crisis had: a) more capital; b) more deposit funding; c) more loans to customers; d) liquid assets; e) iron hand independent supervision; f) more restrictions on bank activities. Curiously the banks that were the shining stars before the crisis, because the market thought a good strategy to be: excess leverage, high securitization, high ROFs, huge portfolio of complex non-traditional banking products, become the worst just in about one short year period. This alerts us that markets are not as well sensed as one might think they should be, and makes it essential to follow market trends cautiously.

This group of studies has shown the strong and deep importance of different regulation frameworks and that regulation and supervision are essential to banks results. However (Koster & Pelster, 2017) find there is no connection between financial penalties and after tax profitability. That is when supervision acts to sanction a bad behaviour there is no impact on returns to bank shareholders. The main reason for this is that tax shields allow banks to easily incorporate the cost of penalties into the reduction of tax payments. This way the negative impact of fiscal penalties in pre-tax returns completely vanishes after taxes. Another not less important conclusion is that on average investors are pleased that penalties are applied; normally because after little time has passed stock prices go up because the problem is considered resolved.

According to (Iasio & Pierobon, 2012) the awareness by financial institutions that they could always count on governments support in case they suffered from severe liquidity problems has been a persistent spell up to now. That is banks know that if they are short on money and if they are big enough, and practice, even in Portugal, has soon that they do not need to be "too big to fail" the public bailout has

⁶ This conclusion is just opposite to what the defenders of narrow (specialized) banks defend. This is very important to note because there are very different opinions and conclusions in the literature about this issue.

always been there to help the bad banks to survive at a large cost to tax payers and implying to abandon other probably more important social policies. Do banks really need this kind of help? And if they do shall tax payers be compelled to act as shareholders? In the authors opinion the fact that banks have been anticipating public help lead them to leverage their balances in a way they would not do if they acquainted with the absence of this malicious safety net. One of the reasons for the crisis was that banks used shadow banking to hypnotize investors with liquid securities based on highly risky and illiquid assets like bad evaluated mortgage back securities. With this practice banks were able to finance themselves at much lower rates than sovereign debt.

The safety net we have been talking proved that it was not, unfortunately, a safety belt in reverse it allowed bad management practices to persist and growth over time. The ‘too-big-to-fail’ banks hypothesis comes as an excuse form governments all over the world to justify the huge amount of money spent to safe the banking systems in their home countries. This terminology is used to define financial institutions that are large enough, or too much interrelated with the economy that if they go bankrupt there would be many other companies that would fallow and eventually the economy as an all could default. This hypothesis was studied by (Mattana, Petroni, & Rossi, 2015) and they were able to demonstrate that large banks, those whose liabilities exceed 2% of the total countries wealth, had been on average, in the years that anticipated the crisis, increasing their risk profile when compared with their smaller peers. These banks also were able to retain more profits measured by ROA indicator. A very important question one should make is did Lehman Brother Bankruptcy destroyed the American economy, or did it provoke an immense wave of uncontrolled unemployment?

Aiming to discover if there was a vigorous effect of regulation on banks competition and profitability, (Chronopoulos, Liu, McMillan, & Wilson, 2015) analyzed a sample of American banks from 2010 back to 1984. They infer that rivalry among banks has strong repercussion on entrepreneurial activity, namely on: a) the opportunity to use credit; b) the possibility to implement new lucrative projects in the economy; c) on allocation of capital funds; d) enlargement of manufacturing industry and services; e) broadening world economy wealth and consequently rising financial strength. Financial innovation, computational advances in particular and technological change in general, together with the metamorphose of regulation framework have deeply transformed the banking industry over the last 20 years. In USA former policies have strained the scope of activity of commercial banks, yet recent deregulation that has decreased or eliminated barriers to entry impacted on the increase of competence between banks in different states making in general profits to fall, even though in some cases they have growth due to the increase in the scope of activity allowed to banks. The Riegle–Neal IBBEA Act (1994) vanished federal restrictions on interstate banking and consequently reduced profit levels, but the Gramm–Leach–Bliley Act (GLBA-1999) has allowed banks to diversify across business segments which allowed an increase in banks’ profits.

According to the authors in general politics in USA have given greater importance on financial stability compared to competition during the crisis period therefore implying a reduction competence in the market. There is a nonlinear trend among bank size and profitability and this one has been strongly influenced by: a) less accurate liquidity management; b) more aggressive loan concession; c) less equity; d) faster pace of asset growth; e) economic cycle, that is returns have been really pro-cyclical. But the

most important tendency is that after the crisis there has been perseverance of increasing banks profitability.

2.3-Main Reasons for the Crisis to affect Banks differently

On (Andreas Dietrich, 2010) perspective after analysing the profitability of nearly 400 commercial banks in Switzerland, there are big differences in profitability among banks. Bank profitability is mainly explained by operational efficiency, funding costs, the growth of total loans and the business model of the bank. Banks that are heavily dependent on interest income are less profitable than banks whose income is more diversified. The recent macroeconomic environment of extremely low interest rates makes this last finding very useful and important for the banking industry.

Due to low interest rates, the banking industry found that shifting away from traditional sources of revenue, like loan making, toward activities that generate fee income, service charges, trading revenue, and other types of noninterest income was a question of survival. However, (Stiroh, 2004) could not verify that an increase in fees or ROFs putting interest margin in a second plan can provide real advantages in terms of less volatility in profits or in any other indicator of financial soundness. In fact he demonstrates that nontraditional sources of income are in fact much more unstable than interest margin.

Basel III establishes strict objectives for Tier 1 and capital in general and is a main pillar on bank regulation. One of the differences to the former agreement is related with the introduction of countercyclical capital requirements. These requirements will adjust to take into account the business cycle, that is in an expansion period capital requirements will increase and during recessions it will decrease. With this adjustment credit would not be increasing as fast during expansion periods and at the same time during recessions there would be a buffer to allow a smooth credit decrease and absorb losses.

In the same line of thought other studies (Aiyar, Calomiris, & Wieladek, 2012) point toward regulation being able to better control the connection between credit concession and the economic cycle through the imposition of capital requirements. In fact, establishing and adjusting these requirements allows regulators to influence not only the amount and quality of lending, but also to decide on the best way to fund the credit, that is, choosing between equity or customers deposits (or wholesale funding). However they alert to a very important point about non regulated banking and the impacts that this group of shadow banking can have. In fact in the UK resident foreign branches are not regulated locally as UK owned banks and resident foreign subsidiaries are regulated. The authors have demonstrated that in this market regulated banks tend to reduce credit when capital requirements increase, but normally shadow banks tend to increase credit at this times in such way they can win market share and new business though balancing out credit reduction by regulated banks. Therefore in this kind of environment this type of policy will not be effective.

(Albertazzi & Gambacorta, 2008) follow also the line of thought that derives from the relationship between credit concession and the different stages of the economic cycle. Their theory proves that banks' financial gains are pro-cyclical mainly because the higher the GDP the more interest they charge due to increasing loans, but also because credit portfolio quality increases and consequently provisions decrease. After the crisis, a generalised deleveraging of the banking industry, mainly in the EU and US, was the most evident consequence. Until 2007, most adjustments in the banking industry were thorough capital

increase via equity issuance, conversion of hybrids, capital injections, or retained earnings. But the sovereign debt crisis made a stronger pressure to adjust reducing assets, that is to say reducing credit to the economy.

Of course, the lack of profitable opportunities for investment made companies reduce their demand for credit, but on the other hand insufficient balance sheet capacity also led to a strong reduction in credit supply.

In fact, when there are capital shortfalls, banks can decide to reduce assets or increase equity, but the first solution was by far the most adopted after the last crisis. The mix adopted by banks may not have been the better in terms of welfare. That is why most regulators and supervisors have intervened to compel banks to raise more capital or with bail-in measures (bank's existing debt holders forced to convert into bank equity).

Of course, from the central banks' side, there is no monetary policy without the so called credit channel. That is, if central banks reduce interest rates to promote the increase of investment during recessions, but banks do not want to give credit to companies, the final impact of decreasing interest rates on economic growth will be very low.

Even though it is unquestionable that despite the importance of this credit mechanism to the implementation of monetary policy, banks should not expect to be bailed out by taxpayers when their investment decisions go wrong. Like any other sectors, companies that go on risky projects with higher revenue, must be ready to the associated downside risk.

In my opinion, although failures of large financial institutions can have devastating consequences for economic stability, banks must bear the consequences of their bad choices.

(Brighia & Venturellib, 2014) have focused on a different point about the interlink between revenue diversification and commercial banks' profitability, using data for Italian banks. In general they infer that an increase in diversification implies an increase in performance. However, during stress periods of severe bad environment, diversification may contribute negatively to risk and performance. Another conclusion reflecting the fact that big banks can better explore economies of scale, and also has better ability to deal with risk, is that diversification concentrated in non-traditional banking revenues is positive if the bank is big enough. This study suggests that capitalization rules to be implemented by regulators should be more tailored made and should not only aim stability.

While most studies focus on big banks, (Regehr & Sengupta, 2016) work on US Community Bankers is one excellent exception and an extraordinary way to analyze this group of regional accessible neighborhood depository institutions normally focused on supporting local business and families. Taking into account technological change, the need for platforms that allows customers to access the bank at a distance, new regulations imposed derived from the crisis (in terms of capital requirements but also of capabilities to report internal management information to the supervisor) and so forth have risen the cost dramatically making urgent the need of these kind of banks to growth. Bigger banks could use scale economies to become more efficient allowing this locally fitted banks to keep serving local agents in small communities.

2.4-Capital Requirements and Financial Soundness

According to (AIYAR, CALOMIRIS, & WIELADEK, 2015)'s approach, to make the regulatory process more credible it must be more market-based, market-linked and market-controlled, that is, there must exist global and specific information available to all stakeholders. But it is not only a question of more rules and goals market oriented; there must be market incentives for the banks to act by the rules, or, in my opinion, they will find a way to work around them. In fact, the recent crisis has shown that simply establishing a connection between capital and asset risk assessment is not enough. A credible and working methodology must be scrupulousness interlinked with the way the market behaves. For the authors, increasing minimum capital obligations will impact on welfare: share prices may decrease; banks' paybacks can go down; and global wealth may suffer another downward tendency; but, in my opinion, won't we be saving a lot of money to taxpayers and if market rationality is incorporated in the rules we would save money for sure in control screenings.

The impact that the regulatory environment has on bank productivity, in what concerns P&L performance measured by profit/cost efficiency, was deeply studied by (Pasiouras, Tanna, & Zopounidis, 2009). Taking into account the three pillars of Basel II, that is: a) guardianship/supervision power; b) Market self-government; c) Capital requisites; but also other restrictions on bank activities, they extrapolate that banking regulations that improve market discipline magnify both cost and profit efficiency. Nevertheless, stricter capital demand tends to improve cost efficiency though reducing profit efficiency. Finally, reducing the scope of bank services normally implies reductions in cost and at the same time improves profit.

The course of events after the crisis has built a new scenario for bank activity: extremely low interest rates, strong capital regulations, and a need to be always in the edge of technology available in each moment. Traditionally banks were paid by the strong difference between credit rates supported by customers and the deposit rates paid to customers by the banks, that is, the net margin used to be the most important source of returns to the banking industry. Nowadays with interest rates near zero, how do banks get the necessary payback to give to their shareholders? (Chang & Talley, 2017) have precisely evaluated how can banks better manage this scenario of very low interest rates and how do they find a way to payback for the investment of their shareholders. They find out that larger banks do have strong motivation to engage in riskier projects with high expected yields in such way they can improve performance and most of all be lucrative. The results of this study prove that in fact lower interest rates do encourage banks, mainly the big ones, to undertake riskier projects. That is to say: putting money into speculative off-balance sheet activities. This fact should alert lawmakers as "to big to fail" banks can seriously damage economic welfare if they do not stay economically and managerially sound.

2.5-Intellectual capital, Corporate Governance and its impact on Banks' profitability

A different but interesting approach to investigate banks performance is done by (Kaupelytė & Kairytė, 2016). These authors have studied how the intellectual capital influences banks' achievements of their goals. They show that big banks after the crisis have suffered negatively from intellectual capital. An

additional conclusion is that in big banks human capital has led to superior risk ratios, and on smaller banks has conducted to better profitability.

The behavioral perspective is also developed by (Thakor, 2015). In this perspective individuals' estimate the probability of an event by the simplicity by which past occurrences can be remembered. Occurrences related with personal experiences are given more importance in our memory. Some future outcomes are sometimes perceived as unique and consequently bygone history of events is believed to be insignificant in establishing the likelihood of their occurrence. Crisis happens because agents believe that the results are determined by the a priori unrevealed skills of banks. Superb outcomes overestimate bankers' skills. After a long succession of good outcomes all agents (banks, regulators and investors) believe that banks are highly competent in managing risk. As an out-turn, agents underestimate the accurate risk present into high risk products and all market institutions run in increasing their investment in them. Risk is badly evaluated because risk management capability is overestimated. Eventually when investors learn about the real risk in these high risk products, liquidity dries and the crises starts. At the same time the persistent sequence of positive banking outcomes makes people allocate a strong capacity to banks to manage risks. Therefore banks access lax regulation and low cost funding, because banks are considered highly skilled. Suddenly there comes a time when the market realizes that the results are skill-independent. At this time creditors withdraw funding and the loan market vanishes. Having this in mind one can understand the reason why before a crisis normally there is an upturn, and then a suddenly crash.

Some authors alleged that one of the main reasons for the crisis was a poor corporate governance framework applied to the banking industry. (Tarazia & Zedeka, 2013) have conducted an investigation into verifying whether the existence of controlling shareholders with more control rights than they would be entitled by the percentage of capital they own can influence risk and bank profitability in a divergent way during normal and troubled times. Using data from hundreds of European banks for the period from 2002 to 2010, that is covering the pre-crisis, crisis and post-crisis. Their results tend to demonstrate that before the crisis if there was a big divergence between shareholders control and their corresponding ownership in terms of capital owned implied lower returns and more risk. During the crisis had a positive impact on banks payback and did not affect risk. After the crisis was gone the effects are exactly the same as before crisis. Eventually they prove that these relations can be strengthening by: a) geographies where shareholder protection is deficient; b) family managed banks; c) unreasonable levels of excess control rights. For the authors ownership structure is very important in elucidating cross-variation in bank performance during the crisis. In their opinion, regulators should scrupulously take into account the shareholders' why of acting in complex ownership structures. Higher quality disclosure of banks' controlling shareholders and their participation in other banks and companies in general are essential for supervisors.

In the last decades corporate governance has increased its importance in terms of company's management. It has become clear that better governance of a company will induce an increase in the total welfare for all stakeholders. Traditional management theory was focused on shareholders, but recent events have shown one must take into account many other perspectives to better understand a company and to be able to manage it more efficiently. Studying the impact of corporate governance on banks outcomes and how the regulators can help in enforcing better practices has also become strategically to

better understand the real financial interconnected world.

(Baklouti, Gautier, & Affes, 2016) are one of the groups of authors studying this kind of issues. In this study they try to prove that the crisis has shown the importance of the link between financial distress and bank governance. For them, developing an internal methodology for monitoring banks can be very useful in preventing financial distress and excessive risk taking by banks. Pale governance, implies increase in banks systemic vulnerability and eventually financial instability. They have studied the role of ownership structure, investors' protection scheme and board of directors into banks default or financial distress. Bank executives are very much concerned with the short run, reach quick profits usually through excessive risk taking making long term a dark scenario for the institution. During the crisis this resulted in large bailouts by the government and by taxpayers having to pay for the disproportionate bonus payments that these bad managers had received in pre-crisis years. This fact is in accordance with the Agency Theory.⁷

In their study they test different hypotheses, namely: a) There is a strong relation among the excessive aggregation of ownership and the probability of financial distress; b) The level of investor protection reduces the likelihood of bankruptcy; c) The larger is the bank bigger is the probability of financial distress; d) The number of board of directors and the possibility to bust .

With their conclusions, they clearly demonstrate that regulators and supervisors should take into account that: a) Board of directors should focus on risk management and not on maximizing short-term returns; b) the agency theory does not take into account the protection of the interests of all bank shareholders; c) compensation committees must have their center of attention on the long term market yield of the bank and not on short-term, sometimes just accounting profits.

It is perfectly clear in the literature that there is a direct connection between Economic Growth and the availability of a strong and healthy bank system that gives access to credit in such a way that the real economy has the finance arm to implement lucrative new projects. Monetary Policy without commercial banks would not exist and the Keynesian framework of Monetary and Budget theory could not work. So for larger National wealth growth we need an efficient and ready to operate commercial banking system.

Of course regulation affects banks' profits in a good and bad way. First it allows banks to operate in a competitive, efficient and clear market. Secondly it is sometimes inefficient in the sense that the costs it brings to be implemented, mainly it is not well prepared and its impacts scrupulously studied, are higher than the benefits the society as a whole gets from it.

Different options in different countries have resulted in different outcomes, or results. There is not a perfect system or general trend, but one thing is for sure studying the impacts of Regulation on the Profitability of commercial banks is not only important, as can save the world a lot of money and other problems.

⁷ ***Adapted from WIKIPEDIA*** The **principal-agent problem**, or **agency dilemma** or the agency problem in political science and economics, occurs when one person or entity (the "agent") is able to make decisions on behalf of, or that impact, another person or entity: the "principal". This dilemma exists because agents are motivated to act in their own best interests, which are contrary to those of their principals and is an example of moral hazard. The problem arises mainly because the two parties have different interests and asymmetric information (the agent having more information), such that the principal cannot directly ensure that the agent is always acting in their (the principal's) best interest.

The banking industry is changing dramatically. Fintech and Shadow banking are creating a new world for finance, less people, more technology, better simplified processes and a lot of new ideas may change entirely what we know and are used to today.

Capital requirements are essential but just one of many factors that can avoid another crisis and put banks on the right track. One must always be aware that if banks are not strong there will be no credit. Consequently, all lucrative new projects in real economy cannot be implemented and the economy will stagnate.

Corporate governance and intellectual capital may have had and for sure will have a much important role that one might think at a first glance and must continue to be studied hard.

This paper addresses the above problems existing in the current literature and contributes to the improving the knowledge of the state of the art in this field. In the next chapter we try to find out whether there is a relation between regulation and commercial banks profitability, and also if there are significant differences among different world regions.

3- Data and summary statistics

“There’s an old saying that in difficult times the return of capital takes precedence over the return on capital.”-Lord J.L.-B.H. Rothschild (2016, 3) quoted by (Seccareccia, 2017)

3.1-The Basic Frame using data for all regions

Our goal is to find out whether there is a strong relationship between regulation and profitability within commercial banking. To answer our research question we built a data base of information aggregated into 4 different regions: North America (USA+CA); European Union (EU); Far East and Central Asia (ASIA); South and Central America (SouthAmerica).

As data provider we use Bankscope⁸. Bankscope contains comprehensive information on banks across the globe. We used it to get the relevant information about individual banks belonging to the groups of countries referred. Bankscope has up to 16 years of detailed accounts for each bank.

As seen on Table 1, North America has the largest number of observations 9610 Banks (76,6% of total number of Banks), while the other three regions selected (European Union, Far East and Central Asia, and South and Central America) have a similar number of banks (24,4% of total observations).

Table 1-Regional Distribution of Database

Region	Number of Banks	%Total
North America	9 610	76,62%
European Union	1 028	8,20%
Far East and Central Asia	1 001	7,98%
South and Central America	904	7,21%
Total	12 543	100%
From 1997 to 2012	16 years	
Number of Observations	200 688	

We will try to find out whether some aspects of regulation and supervision are effectively linked or not to banks’ profits. We will measure this relationship for the all database, and then will try to find out whether there are significant differences between each region.

We used World Bank’s 2011-12 Regulation and Supervision Survey (BRSS) to explore the relationship between profitability and the “state of the art” of regulation and supervision on each country studied.

This survey represents a substantially expanded and updated version of earlier surveys on the same topic made available by the World Bank respectively in 2001, 2003 and 2007. The current, fourth iteration of the survey provides information on bank regulation and supervision for 143 jurisdictions and includes

⁸ We used Bankscope: Update Number 269.2; Software Version 59.01; Data Update 19/12/2012. We used this database under ISEG-UTL (Instituto Superior de Economia e Gestão- Lisbon Technical University) permission. Unfortunately this data base was discontinued in Dez2016, and therefore we could not update the information. For more details on this Data Base please refer to:

<http://www.bvdinfo.com/Products/Company-Information/International/BANKSCOPE.aspx>; Bureau van Dijk’s has recently made available another database Orbis Bank Focus. Even though at the moment this database already includes banks from other countries apart from USA, it still has only six years story, which makes impossible to compare data before and after the Financial Crisis of 2007.

close to 300 questions. Covering the period from 2008 to 2010 and therefore, it allows us to examine the recent state of bank regulation and supervision in a wide range of countries.⁹

In terms of topical coverage, the survey covers 14 broad areas (1) entry into banking, (2) ownership, (3) capital, (4) activities, (5) external auditing requirements, (6) bank governance, (7) liquidity and diversification requirements, (8) depositor (savings) protection schemes, (9) asset classification, provisioning and write-offs, (10) accounting and information disclosure, (11) discipline/problem institutions/exit, (12) supervision, (13) banking sector characteristics, and (14) consumer protection.

There are several papers using this survey to discuss the impact of regulation and supervision on the financial system. (Barth, Caprio, & Levine, 2001) presents the data for the first BRSS. Then (Barth, Caprio, & Levine, 2004) assess the relationship between specific regulatory and supervisory practices and the banking-sector development, efficiency, and fragility.

Using the same data set (Barth, Caprio, & Levine, 2006), show that restrictions on the entry of new banks, government ownership of banks, and restrictions on bank activities, hurt banking system performance.

In 2008 (Barth, Caprio, & Levine, 2008) compare the first three BRSSs and conclude that while many countries strengthened capital regulations and official supervisory agencies over the period, the reforms are not likely to improve bank stability or efficiency.

Finally, (Cihak, Demirguc-Kunt, Peria, & Cheraghrou, 2012) find out that there were significant differences in regulation and supervision between crisis and non-crisis countries¹⁰. They also conclude that the overall regulatory response to the crisis has been slow. The main differences identified were: a) Crisis countries had less rigorous definitions of capital and lower actual capital ratios; b) Banks in crisis countries faced fewer restrictions on non-bank activities such as insurance, investment banking, and real estate; c) Regulations concerning the treatment of bad loans and loan losses were less strict in crisis countries; d) In crisis countries, there were weaker incentives for the private sector to monitor bank's risks.

We have analyzed in depth what were the variables that for different areas of the study were responsible for stronger (in terms that were statistically significant) differences between crisis and non-crisis countries in such way we could introduce them in our study. We used Table 2: Differences in responses between crisis and non-crisis countries, in (Cihak, Demirguc-Kunt, Peria, & Cheraghrou, 2012) and we have chosen four variables BRSS1, BRSS2, BRSS3 and BRSS4, that we think are a good proxy for representing regulation and supervision.

BRSS1 represents the area of the study about capital regime and actual capital levels. We have chosen the question:

9 The 2011–12 Bank Regulation and Supervision Survey is available at <http://go.worldbank.org/WFIEF81AP0>. Data from previous iterations of the survey are available at <http://go.worldbank.org/SNUSW978P0>.

¹⁰ We identified crisis countries using the database assembled by (Laeven & Valencia, 2010) as quoted in (Cihak, Demirguc-Kunt, Peria, & Cheraghrou, 2012) "For the purpose of our calculations, crisis countries consist of two groups of countries identified. The first group comprises 13 countries that experienced a systemic banking crisis between 2007 and 2009 (United States, United Kingdom, Iceland, Ireland, Latvia, Belgium, Luxembourg, Netherlands, Austria, Denmark, Germany, Kazakhstan, and Ukraine). The second group includes 8 countries that experienced a borderline systemic crisis in the same period (France, Greece, Hungary, Portugal, Russia, Slovenia, Spain, and Switzerland). All the other countries in our database are treated as non-crisis countries." We classified for the dummy variable Crisis Countries the first two groups of countries.

“q03_18_00_01-Which of the following items are allowed as part of Tier 1 capital and in what percentages? a. Hybrid debt capital instruments”.

We created a dummy variable with value 0 for the answer Yes, and the value 1 for no answer, or no response. This means that the countries with value 0 are in fact less strict in what concerns the evaluation of Tier1.

BRSS2 aims to represent restrictions on bank activities, and we used three questions to build this variable:

“4.1 What are the conditions under which banks can engage in securities activities?;

4.2 What are the conditions under which banks can engage in insurance activities?;

4.3 What are the conditions under which banks can engage in real estate activities? ”

The answer to these questions takes values from 1 to 4, where higher values denote stronger restrictions.

1: A full range of these activities can be conducted directly in banks; 2: A full range of these activities are offered but all or some of these activities must be conducted in subsidiaries, or in another part of a common holding company or parent; 3: Less than the full range of activities can be conducted in banks, or subsidiaries, or in another part of a common holding company or parent; and 4: None of these activities can be done in either banks or subsidiaries, or in another part of a common holding company or parent. We have built the average value for each country and then we round it to the closest integer. Then we considered the countries with value 1, or 2, the less restrictive with value 0, and the ones with values 3 or 4, the ones with stronger restrictions with value 1.

BRSS3 goal is to represent supervisory powers in cases of bank losses; specifically we have chosen the question: q11_01_00_14-Please indicate whether the following enforcement powers are available to the supervisory agency/require commitment/action from controlling shareholder(s) to support the bank with new equity (e.g. capital restoration plan). The variable take value 1 when the answer is yes, that is when in fact this strong supervisory power in fact exists.

Finally, BRSS4, intends to cover the area for incentives and information for markets to monitor banks and we used question: q10_05_01_03-Do banks disclose to the public ...?/Governance and risk management framework. Variable takes value 1 for the countries where the answer was yes.

Therefore for all BRSS variables 0 means more risk, and 1 means less risk, i.e., stronger regulatory and supervisory powers.

We used STATA¹¹ for analysing the information, and organized data as unbalanced Panel Data: 16 years (1997-2012) of observations for each bank when available.

In Table 2- Variable description we describe the variables we used in our study, even though not all of them are always used in every model. At each point in the text we explain which are used and why.

¹¹ STATA is a complete, integrated statistical package that provides instruments you need for data analysis, data management, and graphics. We used version 14, under Católica Lisbon School of Business and Economics permission for more details on this software please refer to: <http://www.stata.com> .

Table 2- Variable description

Variable Name	Description
Proxies for Profitability	
ROA	Return on average Assets, this is perhaps the most important single ratio in comparing the efficiency and operational performance of banks as it looks at the returns generated from the assets financed by the bank.
ROE	Return on average Equity, The return on equity is a measure of the return on shareholder funds. Obviously here the higher the figure the better but one should be careful in putting too much weight on this ratio as it may be at the expense of an over leveraged balance sheet.
NET INTEREST MARGIN	This ratio is the net interest income expressed as a percentage of earning assets. The higher this figure the cheaper the funding or the higher the margin the bank is commanding. Higher margins and profitability are desirable as long as the asset quality is being maintained.
Explanatory Variables	
TOTAL ASSETS (mil USD)	Total assets according to the Balance Sheet
ln(Total Assets)	ln(Total Assets)
DIVIDEND	Dividend Pay-Out, This is a measure of the amount of post tax profits paid out to shareholders. In general the higher the ratio the better but not if it is at the cost of restricting reinvestment in the bank and its ability to grow its business.
TIER 1 RATIO	This measure of capital adequacy measures Tier 1 capital; that is shareholder funds plus perpetual non cumulative preference shares as a percentage of risk weighted assets and off balance sheet risks measured under the Basel rules. This figure should be at least 4%.
CAPITAL ADEQUACY RATIO	This ratio is the total capital adequacy ratio under the Basle rules. It measures Tier 1 + Tier 2 capital which includes subordinated debt, hybrid capital, loan loss reserves and the valuation reserves as a percentage of risk weighted assets and off balance sheet risks. This ratio should be at least 8% (It's not mandatory under Pillar III). This ratio cannot be calculated simply by looking at the balance sheet of a bank but has to be calculated internally by the bank. At their option they may publish this number in their annual report.
EQUITY/TOT ASSETS	As Equity is a cushion against asset malfunction, this ratio measures the amount of protection afforded to the bank by the Equity they invested in it. The higher this figure the more protection there is.
EQUITY/NET LOANS	This ratio measures the Equity cushion available to absorb losses on the loan book.
EQUITY/CUSTOMER & SHORT TERM FUNDING	This ratio measures the amount of permanent funding relative to short term potentially volatile funding. The higher this figure the better.
EQUITY/LIABILITIES	This leverage ratio is simply another way of looking at the Equity funding of the balance sheet and is another of looking at capital adequacy.
Crisis Group	It is a dummy variable that takes the value 1, when a country is classified as a Crisis Country according to (Laeven & Valencia, 2010)
BRSS1	Evaluates about capital regime and actual capital levels, it is a dummy variable that takes value 0 when the countries are less strict in analysing capital levels (0=more risk;1=less risk)
BRSS2	Aims to represent restrictions on bank activities, it takes value 1, when countries are more restrictive (0=more risk;1=less risk)
BRSS3	This variable goal is to represent supervisory powers in cases of bank losses, it takes value 1 when supervisory power is stronger. (0=more risk;1=less risk)
BRSS4	Intends to cover the area for incentives and information for markets to monitor banks, it takes value 1 when there is a strong incentive for disclosure of information (0=more risk;1=less risk)

A simple correlation matrix between these variables allows identifying that it is not a good idea to use some of the variables simultaneously, since we probably would be explaining just the same thing. For instance, we decided not to use Tier 1 Capital and Capital Adequacy Ratio simultaneously because the correlation between these two variables is 69%. A similar relationship is seen between Equity to Liabilities ratio and Equity to Customer and short term funding ratio (77%), or Equity to Total assets with Equity to Liabilities (83%). Other variables, as can be seen in Table 3- General Correlation Matrix between variables, do not seem to have such a strong relation with each other.

Table 3- General Correlation Matrix between variables

	ROA	ROAE	NIntMargin	TAssets	LNTAssets	Dividend	Tier1Ratio	TCapitalRatio	E_TAssets	E_NetLoans	E_CShortFu	E_Liabilities	CrisisGrou	BRS1	BRS2	BRS3	BRS4
ROA	1	0,53	0,34	-0,04	-0,06	0,10	0,16	0,11	0,41	0,18	0,26	0,26	-0,05	-0,07	0,01	0,00	-0,08
ROAE	0,53	1	0,13	0,00	0,01	0,09	0,02	0,01	0,06	0,03	0,04	0,03	-0,07	-0,05	0,03	-0,04	-0,05
NIntMargin	0,34	0,13	1	-0,10	-0,22	0,00	0,10	0,10	0,33	0,08	0,19	0,21	-0,08	-0,09	-0,02	0,08	-0,13
TAssets	-0,04	0,00	-0,10	1	0,56	0,00	-0,06	-0,04	-0,14	-0,02	-0,04	-0,08	-0,03	-0,07	-0,10	-0,12	0,02
LNTAssets	-0,06	0,01	-0,22	0,56	1	0,02	-0,21	-0,18	-0,28	-0,12	-0,09	-0,17	-0,22	-0,17	-0,24	-0,19	0,05
Dividend	0,10	0,09	0,00	0,00	0,02	1	0,02	0,01	0,02	0,00	0,03	0,01	0,03	0,01	0,01	0,02	0,00
Tier1Ratio	0,16	0,02	0,10	-0,06	-0,21	0,02	1	0,69	0,54	0,42	0,38	0,54	0,00	-0,06	-0,02	0,04	-0,04
TCapitalRatio	0,11	0,01	0,10	-0,04	-0,18	0,01	0,69	1	0,49	0,37	0,37	0,52	-0,02	-0,09	-0,04	0,01	-0,04
E_TAssets	0,41	0,06	0,33	-0,14	-0,28	0,02	0,54	0,49	1	0,41	0,66	0,83	0,08	-0,04	0,06	0,12	-0,04
E_NetLoans	0,18	0,03	0,08	-0,02	-0,12	0,00	0,42	0,37	0,41	1	0,29	0,35	-0,04	-0,09	-0,05	0,04	-0,01
E_CShortFunding	0,26	0,04	0,19	-0,04	-0,09	0,03	0,38	0,37	0,66	0,29	1	0,77	-0,01	-0,09	-0,04	0,05	-0,01
E_Liabilities	0,26	0,03	0,21	-0,08	-0,17	0,01	0,54	0,52	0,83	0,35	0,77	1	0,03	-0,05	0,02	0,07	-0,02
CrisisGroup	-0,05	-0,07	-0,08	-0,03	-0,22	0,03	0,00	-0,02	0,08	-0,04	-0,01	0,03	1	0,43	0,59	0,20	0,23
BRS1	-0,07	-0,05	-0,09	-0,07	-0,17	0,01	-0,06	-0,09	-0,04	-0,09	-0,09	-0,05	0,43	1	0,48	0,58	-0,08
BRS2	0,01	0,03	-0,02	-0,10	-0,24	0,01	-0,02	-0,04	0,06	-0,05	-0,04	0,02	0,59	0,48	1	0,17	0,03
BRS3	0,00	-0,04	0,08	-0,12	-0,19	0,02	0,04	0,01	0,12	0,04	0,05	0,07	0,20	0,58	0,17	1	0,01
BRS4	-0,08	-0,05	-0,13	0,02	0,05	0,00	-0,04	-0,04	-0,04	-0,01	-0,01	-0,02	0,23	-0,08	0,03	0,01	1

In Table 4 you can see a more detailed description of each variable when all regions are considered.

Table 4- Global variable description

All Regions									
Variable Name	Number OBS	Mean	Median	Std.Dev	Min	Max	Skewness	Kurtosis	
ROA	34246	0,008	0,009	0,067	-5,212	1,856	-25,238	1 472,880	
ROE	34205	0,085	0,095	0,333	-9,920	9,671	-1,671	268,830	
NET INTEREST MARGIN	34027	0,042	0,034	0,120	-9,875	5,833	-29,789	2 430,733	
TOTAL ASSETS	60560	41 780,250	1 767,154	210 583,000	0,387	3 554 066,000	8,949	96,159	
ln(Total Assets)	60560	7,590	7,477	2,471			0,065	3,346	
DIVIDEND	18148	0,411	0,308	0,729	-9,500	9,896	3,084	55,697	
TIER 1 RATIO	16731	0,163	0,112	0,307	-74 738,000	7,364	9,708	175,398	
CAPITAL ADEQUACY RATIO	20903	0,186	0,129	0,312	-6,783	8,241	8,537	177,541	
EQUITY/TOT ASSETS	34404	0,128	0,091	0,270	-9,929	1,002	-15,834	469,526	
EQUITY/NET LOANS	32816	0,394	0,162	0,877	-8,210	9,952	5,717	45,605	
EQUITY/CUSTOMER & SHORT TERM	33497	0,246	0,112	0,687	-8,630	9,984	7,446	82,675	
EQUITY/LIABILITIES	34013	0,221	0,101	0,626	-1,074	9,977	8,644	96,137	

In terms of the ratios, we normally consider a good proxy for profitability: ROA, ROE and Net Interest Margin. Using simple statistics, we see that ROA is on average about 0,8%. Its Mean and Median are very close, even though its Skewness tends to show a negatively Skewed distribution. The fact is that standard deviation is very low 6.7%, which makes it a good proxy for profitability among different banks. Its distribution is not very far from Normal Distribution, even though with a strong tendency to be Leptokurtic, more peaked than Normal Distribution, that is a Fat Tails Distribution.

Other proxy for profitability is ROE. This widely used indicator is on average 8.5%, even though its dispersion around the mean is very high 33% Standard Deviation. However, its Skewness, close to zero, demonstrates that this distribution is symmetric. We know that we must interpret this ratio carefully since sometimes the reason behind its high value is in fact due to excessive balance leverage.

Finally Net Interest Margin is on average 4.2% with a controlled dispersion: 12% Standard Deviation. In spite of the fact that margin is a good indicator for profitability, recently changes in the market have reduced its importance in terms of total returns, and commissions have been increasing its weight in terms

of income of major commercial banks. In fact, this has been the answer from many banks to tighter Regulation, and a way to give shareholders a reasonable return on their investment. For this reason using this variable as a global proxy for Profitability may be of lesser value.

We have decided to use ROA as a proxy for profitability, since we believe that in general this variable will represent profitability more efficiently than ROE or Net Interest Margin.

As for the **possible explanatory variables for Profitability we used $\ln(\text{Total Assets})$ to take account for Dimension; Tier 1 Ratio, Equity/Tot Assets, and Equity/Net Loans**, as indicators that, on the one hand, we believe to have a strong explanatory power, and on the other hand are more directly or indirectly influenced by Banking Regulators.

As explained before, *we have built some Dummy variables that we believe capture some qualitative aspects of regulation. We introduced BRSSI to 4 variables that characterize the main aspects of regulation*. Even though they do not affect directly the commercial banks' financial reports, indirectly they may be a strong driver for the impact of regulation.

We have also used as dummy an indicator of CrisisGroup country. This variable shows whether the country where the bank operates belongs to the group of countries that were directly affected by the financial crises initiated in 2007, with the bankruptcy of Lehman Brothers.

We decided not to use Dividends in our analysis because this ratio is strongly influenced by management's decisions that are out of the scope of this study. Capital Adequacy Ratio, Equity/Customer & short term funding and Equity/Liabilities are also not used because of strong correlation with other explanatory variables, as shown in the correlation Matrix.

On a first look, we can see that on average Tier 1 Ratio is much higher, about three times larger, than its minimum regulatory value of 4%. A similar conclusion can be driven from Capital Adequacy Ratio whose minimum regulatory value is 8%. Evidence shows that normally banks decide to have ratios much higher than their minimum values. However standard deviation is about 30%, stating many differences among banks analysed.

According with (Elizalde & Repullo, 2007) regulatory capital (the minimum required by regulation) depends on the confidence level set by the regulator, while economic capital (that chosen by shareholders without regulation) is mainly influenced by the intermediation margin and the cost of bank capital. Normally economic capital is above regulatory capital for low values of the cost of capital. The intermediation margin has two opposite effects on economic capital: on the one hand, higher margin incentivizes shareholders to put more money in the bank; on the other hand, higher margin provides a source of income that reduces the need to hold capital as a buffer against losses. The authors show that the first positive effect outweighs the second negative in sufficiently competitive credit markets, and also that these variables can take account for large deviations from regulatory capital. However, there are common variables impacting both types of capital, for example loans' probability of default and loss given default. Their results show that the threat of closing critically undercapitalized banks significantly increases actual bank capital. The most important conclusion that comes out of this study is that the effects on the bank's capital structure of policies aimed at increasing market discipline, such as those contemplated in pillar 3 of Basel II, proxied by coverage of deposit insurance, may be very limited.

3.2-Regression Analyses

We tried to find out whether there is a relationship between Profitability (ROA) and explanatory variables we have chosen and that directly or indirectly are influenced by Regulation. We built an unbalanced Panel Data set, and we estimated the parameters for the following Model:

Equation 1

$$ROA = \alpha + \beta_1 * \ln(TotAssets) + \beta_2 * Tier1Ratio + \beta_3 * \frac{Equity}{TotAssets} + \beta_4 * \frac{Equity}{NetLoans} + \beta_5 * CrisisGroup + \beta_6 * BRSS1 + \beta_7 * BRSS2 + \beta_8 * BRSS3 + \beta_9 * BRSS4$$

The main results are on Table 5.

Table 5- Regression Output RE

Random-effects GLS regression

Group variable:	Index
Number of obs:	16,159
Number of groups	2,180
R-sq:	
within	0,063
between	0,083
overall	0,092
Wald chi2(10) =	1092,780
Prob > chi2 =	0,000

	b	Std.Err.	z	pvalue	[95% Conf. Interval]	
LNTAssets	0,001	0,000	6,168	0,000	0,001	0,001
Tier1Ratio	-0,010	0,001	-6,765	0,000	-0,012	-0,007
E_TAssets	0,106	0,004	29,096	0,000	0,099	0,114
E_NetLoans	-0,001	0,000	-1,931	0,054	-0,002	0,000
CrisisGroup	-0,003	0,001	-3,473	0,001	-0,004	-0,001
BRSS1	-0,001	0,001	-0,816	0,415	-0,003	0,001
BRSS2	0,003	0,001	3,930	0,000	0,002	0,005
BRSS3	0,000	0,001	0,168	0,867	-0,002	0,002
BRSS4	-0,003	0,002	-1,684	0,092	-0,006	0,000
_cons	-0,008	0,002	-3,264	0,001	-0,012	-0,003

The model is globally valid, and so are most explanatory variables, except BRSS(1,3&4) and E_Netloans. We can say that dimension (ln(TotAssets)), EQUITY/TOTASSETS and BRSS2 have a positive relationship with ROA.

On the other hand, Tier 1 Ratio and belonging to the Crisis Group tends to have a negative impact on ROA.

Tier1ratio, one of Basel's most fundamental ratio, and which as we saw has much bigger values than the compulsory minimum of 4%, does not seem to have a positive relation with ROA. Of course we must

take into account endogeneity. That is, there are for sure many unobserved factors that may affect banks' Tier 1 ratio and also ROA, for instance risk aversion, managerial preferences and so forth. This way we must be careful enough not to do casual analysis but only saying that it seems that the Tier 1 ratio is associated with ROA in a negative way.

The negative relation of Tier 1 Ratio to ROA, meaning that larger Tier 1 ratios have not been associated with larger bank returns. Of course we must always take into account that there is an important risk return trade-off associated. That is less risk meaning higher Tier 1 means lower funding costs and less return.

When we recalculate the same model but with Fixed Effects, that is assuming that differences across Banks can be captured in differences in the constant term in each equation, instead of Random Effects, the results are not much different, but many variables are excluded because of collinearity (see Table 6).

Table 6- Regression Output FE

Fixed-effects (within)regression

Group variable:	Index
Number of obs:	16,159
Number of groups :	2,180
R-sq:	
within	0,063
between	0,064
overall	0,085
F(3,13976) =	314,410
Prob > F	0,000

	b	Std.Err.	t	pvalue	[95% Conf. Interval]	
LNTAssets	Omitted					
Tier1Ratio	-0,008	0,002	-4,824	0,000	-0,011	-0,005
E_TAssets	0,125	0,004	27,909	0,000	0,116	0,134
E_NetLoans	-0,001	0,001	-2,562	0,010	-0,003	-0,000
CrisisGroup	Omitted					
BRSS1	Omitted					
BRSS2	Omitted					
BRSS3	Omitted					
BRSS4	Omitted					
_cons	-0,003	0,000	-6,876	0,000	-0,003	-0,002

An inevitable question is: Which model should be used? "It is possible to test for orthogonality of the random effects and regressors. The specification test devised by Hausman" (Greene, 1997). So we applied this test to our data. Even though the result is clear to state that fixed effects is a better model to explain ROA, the fact that it omits many of the variables we want to analyse we decided to use Random effects model instead. This omission comes from the fact that the fixed effects estimator only explores variation within banks. Because the BRSS and Crisis Group, do not vary over time for each bank (and country) the associated coefficients cannot be estimated with a bank fixed effects model.

Nevertheless, this model is globally valid and Tier 1 continues to have an apparent negative relation with ROA, and E_TAssets maintains a positive relation.

Using the random-effects estimator, we analyse two additional options: Lagged variables, and Cluster by country.

Table 7- Regression Output RE one period Lagged Explanatory Variables

**Random-effects GLS regression
one period Lagged Explanatory
Variables**

Group variable:	Index
Number of obs:	14,282
Number of groups :	2,105
R-sq:	
within	0,002
between	0,057
overall	0,023
Wald chi2(10) =	100,250
Prob > chi2 =	0,000

	b	Std.Err.	z	pvalue	[95% Conf. Interval]	
LNTAssets	-0,000	0,000	-0,630	0,529	-0,000	0,000
Tier1Ratio	-0,007	0,002	-3,751	0,000	-0,010	-0,003
E_TAssets	0,026	0,004	5,985	0,000	0,017	0,034
E_NetLoans	-0,001	0,001	-1,253	0,210	-0,002	0,000
CrisisGroup	-0,003	0,001	-4,510	0,000	-0,005	-0,002
BRSS1	-0,001	0,001	-1,501	0,133	-0,003	0,000
BRSS2	0,004	0,001	5,070	0,000	0,003	0,006
BRSS3	0,000	0,001	0,040	0,968	-0,002	0,002
BRSS4	-0,004	0,002	-2,591	0,010	-0,007	-0,001
_cons	0,012	0,002	5,045	0,000	0,007	0,016

This Model allows us to reduce the impact of the explanatory variables among themselves and let us better understand the impact of each variable on ROA. The main problem with this model is that many variables are not significant at a 5% Confidence Interval. BRSS2 and 4 are now more significant and the model as a whole is valid. The negative tendency for Tier1, and the positive contribution of E_TAssets is equal to previous models.

So we decided to evaluate whether we could improve our model if we cluster by Country, that is, if we consider that within each country there can be some commonality. Results are on Table 8.

Table 8- Regression Output RE Cluster by Country

Random-effects GLS regression
Cluster by Country

Group variable:	Index
Number of obs:	16,159
Number of groups :	2,180
R-sq:	
within	0,063
between	0,083
overall	0,099
Wald chi2(10) =	32,730
Prob > chi2 =	0,000

	b	Std.Err.	z	pvalue	[95% Conf. Interval]	
LNTAssets	0,001	0,001	1,594	0,111	-0,000	0,002
Tier1Ratio	-0,010	0,005	-1,946	0,052	-0,019	0,000
E_TAAssets	0,106	0,042	2,513	0,012	0,023	0,189
E_NetLoans	-0,001	0,001	-0,585	0,558	-0,004	0,002
CrisisGroup	-0,003	0,001	-2,040	0,041	-0,005	-0,000
BRSS1	-0,001	0,003	-0,310	0,756	-0,006	0,004
BRSS2	0,003	0,002	1,583	0,113	-0,001	0,008
BRSS3	0,000	0,002	0,098	0,922	-0,004	0,004
BRSS4	-0,003	0,003	-0,879	0,379	-0,009	0,003
_cons	-0,008	0,011	-0,679	0,497	-0,030	0,014

Unfortunately even though this model is globally valid we have to reject almost all explanatory variables. So we decide that in this particular case the more adequate model to use is the simple Random Effects.

3.3-Slightly Different approach- trying BRSS' variables to be significant

Up to the moment we have not been very lucky on concluding about the impact of the BRSS's variables. In fact, due to the way these variables are made available (just one observation which does not change over time), has made them almost always not significant at a 5% confidence interval test.

So we have decided to construct another model in which we have calculated the average on all banks for country for the variables ROA, Total Assets, Tier1 Ratio, Equity/Total Assets and Equity/NetLoans, and then make a simple regression Model as the one specified in Equation 1. With this procedure even though we lose the evolution along the time that Panel Data makes available, we are able to have just one observation representing all banks by country for these variables, allowing us to make a simple regression model in which BRSS' variables could have more explanatory power.

The results for this regression are as follows:

Table 9- Regression Output Simple Regression Model by Country

Simple Regression Model by Country	
---	--

Number of obs:	76
R-sq:	0,700
Adj R-squared	0,659
F	17,112
Prob>F	0,000

	b	Std.Err.	z	pvalue	[95% Conf. Interval]	
LNTAssets	0,001	0,001	1,594	0,111	-0,000	0,002
Tier1Ratio	-0,010	0,005	-1,946	0,052	-0,019	0,000
E_TAssets	0,106	0,042	2,513	0,012	0,023	0,189
E_NetLoans	-0,001	0,001	-0,585	0,558	-0,004	0,002
CrisisGroup	-0,003	0,001	-2,040	0,041	-0,005	-0,000
BRSS1	-0,001	0,003	-0,310	0,756	-0,006	0,004
BRSS2	0,003	0,002	1,583	0,113	-0,001	0,008
BRSS3	0,000	0,002	0,098	0,922	-0,004	0,004
BRSS4	-0,003	0,003	-0,879	0,379	-0,009	0,003
_cons	-0,008	0,011	-0,679	0,497	-0,030	0,014

Even though the Model is globally valid, almost all variables are not significant at a 5% confidence interval, meaning that this new Model is not good for our goal of getting outputs that allowed us to conclude on the relation between ROA and the BRSS' variables.

In the next section we will estimate this Model for different regions and try to find out whether we can find any significant differences.

3.4-Analysing differences between regions

In order to find out whether there were major differences among the regions in the study, we recalculate the Model specified on Equation 1, for each region considered in this study. The main outputs are reported in the Appendix.

We see that even though ROA on average is very similar, standard deviation on South America is much higher than the one in the other regions, stating much larger differences among banks in this region.

The mean for Total Assets in South America is much lower compared with the other zones, meaning that banks are smaller in this area. Also interesting to note that the mean for this variable in US+CA is less than the one in EU and ASIA, even though the difference is by far less important than the one we observe

in South America.

On average Tier 1 Ratio is higher in USA+CA and South America than in EU and Asia, probably reflecting the impact of local legislation, but also the different economic contexts.

In what concerns the negative contribution of Tier1 to ROA, the results are not very different in each region, when compared the total data. Even though in EU the contribution is positive, we cannot take this conclusion into account because the variable is not significant at a 5% confidence interval.

In Asia the contribution of the ratio Equity/Total Assets is much higher than in the other regions. Therefore, even though this ratio seems to contribute always in a positive way to ROA, the fact is that the contribution in this region is by far more important.

Dimension measured through $\ln(\text{TotAssets})$ continues to have a positive impact on Profitability.

4- Conclusions

“On a brighter note, after several troubled years, the banking industry has resumed its normal profitability and relatively strong capital position.” (Olson, 2016)

Using slightly different models relating ROA with explanatory variables that directly or indirectly may be considered as proxies for regulation, we conclude that normally bank dimension measured by $\ln(\text{total assets})$ and Equity to Total Assets have a positive relationship with ROA. This is, in general, larger and more capitalized banks have better profitability.

In this way it seems logic that some regulators are demanding for more Equity in the banking Industry, and also that some, like the European Central Bank, are focusing much more attention on larger banks.

Also as expected, banks belonging to countries in the Crisis Group during the latter financial crisis had a negative impact on ROA. This variable in all models studied had a negative contribution to profitability.

We also found an apparent negative contribution of Tier 1 Ratio to ROA, meaning that larger Tier 1 ratios have not been determinant to increase bank returns. However, there is a lot of endogeneity in our empirical setting and therefore we cannot run into precipitate conclusions. Of course we must always take into account that there is an important risk return trade-off associated with this ratio. That is less risk meaning higher Tier 1 means smaller funding costs and less return.

As for the BRSS variables, because unfortunately, we do not have information of how they have evolved during the years, nor do we know how they affected each bank individually, we could not conclude much from them. But BRSS 2, that is restrictions on the scope of banking activities, seems to have a positive impact on returns, giving reason to the ones asking for narrow and more focused banks.

We have created a specific model to handle this problem. And we calculate averages by country for all the other variables we were not successful in finding a strong relation between for these variables and ROA.

Our analysis offers an important contribution to the existing literature on the impact of Regulation on Profitability. We conclude that it is not irrelevant and that it must continue to be studied attentively. The more one gets to know about it, the more solid and strong will be the banking industry and consequently future crisis, though inevitable, will be less costly.

The upcoming increasing activity of Fintech and Shadow Banking, but also the strong negative impact on world income of the last financial crisis and most of all the higher amounts each of us as tax payers have had to pay to maintain a safe and working banking industry able to finance real economy, are sufficient reasons for further investigation in this field.

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Appendix 1- Summary USA+CA Data

USA+CA					
Variable Name	Number OBS	Mean	Std.Dev	Min	Max
ROA	8,836	0,009	0,028	-1,628	0,534
ROE	8,835	0,079	0,252	-6,100	9,179
NET INTEREST MARGIN	8,821	0,037	0,064	-4,522	1,197
TOTAL ASSETS	13,632	42 493,420	192 839,700	1,214	2 265 792,000
ln(Total Assets)	13,632	7,955	2,134	0,194	14,633
DIVIDEND	7,999	0,394	0,713	-7,917	9,600
TIER 1 RATIO	7,411	0,173	0,373	-0,137	7,364
CAPITAL ADEQUACY RATIO	7,609	0,179	0,347	-0,477	7,388
EQUITY/TOT ASSETS	8,859	0,112	0,097	-1,357	1,000
EQUITY/NET LOANS	8,624	0,208	0,433	-0,617	9,750
EQUITY/CUSTOMER & SHORT TERM	8,721	0,172	0,421	-1,899	9,814
EQUITY/LIABILITIES	8,831	0,157	0,407	-0,576	9,876

Appendix 2- Summary EU Data

EU					
Variable Name	Number OBS	Mean	Std.Dev	Min	Max
ROA	9,097	0,008	0,057	-1,846	1,856
ROE	9,074	0,066	0,312	-9,923	9,246
NET INTEREST MARGIN	8,966	0,026	0,048	-0,898	2,267
TOTAL ASSETS	16,448	61 459,360	263 907,100	0,039	2 799 978,000
ln(Total Assets)	16,448	7,820	2,514	-3,253	14,845
DIVIDEND	3,197	0,535	0,839	-9,091	9,740
TIER 1 RATIO	2,577	0,148	0,178	-0,060	4,570
CAPITAL ADEQUACY RATIO	3,793	0,173	0,184	-0,115	2,750
EQUITY/TOT ASSETS	9,138	0,143	0,191	-0,444	1,002
EQUITY/NET LOANS	8,496	0,505	1,035	-0,673	9,854
EQUITY/CUSTOMER & SHORT TERM	8,717	0,270	0,784	-7,000	9,900
EQUITY/LIABILITIES	8,935	0,264	0,811	-0,308	9,977

Appendix 3- Summary ASIA Data

ASIA					
Variable Name	Number OBS	Mean	Std.Dev	Min	Max
ROA	8,387	0,008	0,043	-1,004	1,200
ROE	8,372	0,086	0,423	-9,696	9,671
NET INTEREST MARGIN	8,335	0,035	0,043	-0,631	1,797
TOTAL ASSETS	16,016	53 472,780	248 743,900	2,657	3 554 066,000
ln(Total Assets)	16,016	8,225	2,465	0,977	15,084
DIVIDEND	4,101	0,350	0,621	-9,500	8,242
TIER 1 RATIO	5,371	0,142	0,243	-7,474	4,615
CAPITAL ADEQUACY RATIO	6,421	0,182	0,263	-4,869	4,615
EQUITY/TOT ASSETS	8,424	0,113	0,155	-4,869	1,000
EQUITY/NET LOANS	8,266	0,303	0,716	-8,210	9,661
EQUITY/CUSTOMER & SHORT TERM	8,327	0,204	0,562	-3,446	9,114
EQUITY/LIABILITIES	8,37	0,173	0,443	-0,830	9,500

Appendix 4- Summary South America Data

South America					
Variable Name	Number OBS	Mean	Std.Dev	Min	Max
ROA	7,926	0,009	0,113	-5,212	0,622
ROE	7,924	0,115	0,327	-8,093	7,315
NET INTEREST MARGIN	7,905	0,073	0,226	-9,875	5,833
TOTAL ASSETS	14,464	5 782,506	32 121,060	0,143	527 883,500
ln(Total Assets)	14,464	6,282	2,240	-1,944	13,177
DIVIDEND	2,852	0,407	0,772	-6,313	9,896
TIER 1 RATIO	1,372	0,222	0,316	-0,047	4,701
CAPITAL ADEQUACY RATIO	3,08	0,231	0,421	-6,783	8,241
EQUITY/TOT ASSETS	7,983	0,145	0,486	-9,929	1,000
EQUITY/NET LOANS	7,43	0,585	1,132	-7,813	9,952
EQUITY/CUSTOMER & SHORT TERM	7,732	0,347	0,889	-8,630	9,984
EQUITY/LIABILITIES	7,877	0,297	0,732	-1,074	9,865

Appendix 5- Output Results for USA+CA Data

Random-effects GLS regression

North America

Group variable:	Index
Number of obs:	7,286
Number of groups	726,000
R-sq:	
within	0,015
between	0,039
overall	0,066
Wald chi2(7) =	
Prob > chi2 =	0,000

	b	Std.Err.	z	pvalue	[95% Conf. Interval]	
LNTAssets	0,001	0,000	3,326	0,001	0,000	0,001
Tier1Ratio	-0,015	0,002	-8,350	0,000	-0,019	-0,012
E_TAssets	0,057	0,005	11,541	0,000	0,047	0,066
E_NetLoans	-0,001	0,001	-0,977	0,329	-0,002	0,001
CrisisGroup	-0,001	0,002	-0,624	0,532	-0,005	0,003
BRSS1	Omitted					
BRSS2	Omitted					
BRSS3	0,000	0,003	0,033	0,974	-0,005	0,005
BRSS4	Omitted					
_cons	0,000	0,000	0,000	0,000	0,000	0,000

Appendix 6- Output Results for EU Data

Random-effects GLS regression

European Union

Group variable:	Index
Number of obs:	2,389
Number of groups	416
R-sq:	
within	0,011
between	0,018
overall	0,035
Wald chi2(10) =	33,770
Prob > chi2 =	0,000

	b	Std.Err.	z	pvalue	[95% Conf. Interval]	
LNTAssets	0,001	0,000	1,675	0,094	-0,000	0,002
Tier1Ratio	0,003	0,004	0,788	0,431	-0,004	0,010
E_TAssets	0,051	0,012	4,101	0,000	0,026	0,075
E_NetLoans	-0,006	0,001	-4,337	0,000	-0,008	-0,003
CrisisGroup	-0,001	0,003	-0,491	0,624	-0,007	0,004
BRSS1	0,002	0,004	0,650	0,516	-0,005	0,010
BRSS2	0,003	0,004	0,693	0,488	-0,005	0,011
BRSS3	-0,001	0,003	-0,258	0,797	-0,006	0,005
BRSS4	-0,002	0,009	-0,194	0,846	-0,020	0,017
_cons	-0,004	0,009	-0,490	0,624	-0,021	0,013

Appendix 7- Output Results for ASIA Data

Random-effects GLS regression

Far East and Central Asia

Group variable:	Index
Number of obs:	5,154
Number of groups	738
R-sq:	
within	0,260
between	0,087
overall	0,148
Wald chi2(9) =	
Prob > chi2 =	0,000

	b	Std.Err.	z	pvalue	[95% Conf. Interval]	
LNTAssets	0,002	0,000	7,766	0,000	0,002	0,003
Tier1Ratio	-0,006	0,003	-1,871	0,061	-0,012	0,000
E_TAssets	0,172	0,007	26,237	0,000	0,159	0,185
E_NetLoans	0,002	0,001	2,111	0,035	0,000	0,004
CrisisGroup	0,000	0,000	0,000	0,000	0,000	0,000
BRSS1	0,002	0,001	1,342	0,180	-0,001	0,005
BRSS2	0,004	0,001	3,285	0,001	0,002	0,006
BRSS3	-0,002	0,002	-1,346	0,178	-0,006	0,001
BRSS4	0,010	0,003	3,511	0,000	0,004	0,015
_cons	-0,039	0,004	-9,535	0,000	-0,047	-0,031

Appendix 8- Output Results for South America Data

Random-effects GLS regression

South and Central America

Group variable:	Index
Number of obs:	1,330
Number of groups	299
R-sq:	
within	0,004
between	0,130
overall	0,070
Wald chi2(9) =	
Prob > chi2 =	0,000

	b	Std.Err.	z	pvalue	[95% Conf. Interval]	
LNTAssets	0,001	0,001	1,933	0,053	-0,000	0,003
Tier1Ratio	-0,011	0,004	-2,483	0,013	-0,020	-0,002
E_TAssets	0,064	0,012	5,436	0,000	0,041	0,088
E_NetLoans	-0,000	0,001	-0,353	0,724	-0,002	0,002
CrisisGroup	0,000	0,000	0,000	0,000	0,000	0,000
BRSS1	-0,009	0,004	-2,174	0,030	-0,017	-0,001
BRSS2	0,002	0,004	0,551	0,582	-0,005	0,010
BRSS3	0,001	0,005	0,203	0,839	-0,009	0,012
BRSS4	-0,007	0,003	-2,055	0,040	-0,013	-0,000
_cons	0,009	0,009	0,989	0,323	-0,009	0,027

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